ET 150 396 318 US

ENHANCING THE READING OF LONG PAGES IN WEB BROWSERS

BACKGROUND OF THE INVENTION

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Field of the Invention

This invention relates to accessing Web pages over the
Internet, and more specifically to displaying pages having a
length longer than what can be displayed on a display
10 screen, and displaying those pages in a way that enhances
the reading of those pages.

Description of the Related Art

As computational devices continue to proliferate
throughout the world, there also continues to be an increase
15 in the use of networks connecting these devices.
Computational devices include large mainframe computers,
workstations, personal computers, laptops and other portable
devices including wireless telephones, personal digital
assistants, automobile-based computers, etc. Such portable
20 computational devices are also referred to as "pervasive"
devices. The term "computer" or "computational device", as
used herein, may refer to any of such device which contains
a processor and some type of memory.

The computational networks may be connected in any type
25 of network including the Internet, an intranet, a local area
network (LAN) or a wide area network (WAN). The networks

connecting computational devices may be "wired" networks, formed using lines such as copper wire or fiber optic cable, wireless networks employing earth and/or satellite-based wireless transmission links, or combinations of wired and

5 wireless network portions. Many such networks may be organized using a client/server architecture, in which "server" computational devices manage resources, such as files, peripheral devices, or processing power, which may be requested by "client" computational devices. "Proxy servers"

10 can act on behalf of other machines, such as either clients or servers.

A widely used network is the Internet. The Internet, initially referred to as a collection of "interconnected networks", is a set of computer networks, possibly

15 dissimilar, joined together by means of gateways that handle data transfer and the conversion of messages from the sending network to the protocols used by the receiving network. When capitalized, the term "Internet" refers to the collection of networks and gateways that use the TCP/IP

20 suite or protocols.

Currently, the most commonly employed method of transferring data over the Internet is to employ the World Wide Web environment, referred to herein as "the Web". Other Internet resources exist for transferring information,

25 such as File Transfer Protocol (FTP) and Gopher, but have not achieved the popularity of the Web. In the Web environment, servers and clients effect data transfer using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text,

30 still graphic images, audio, motion video, etc.). The

information in various data files is formatted for
presentation to a user by a standard page description
language, the Hypertext Markup Language (HTML).

In addition to basic presentation formatting, HTML
5 allows developers to specify "links" to other Web resources
identified by a Uniform Resource Locator (URL). A URL is a
special syntax identifier defining a communications path to
specific information. Each logical block of information
accessible to a client, called a "page" or a "Web page", is
10 identified by a URL. The URL provides a universal,
consistent method for finding and accessing this
information, not necessarily for the user, but mostly for
the user's Web "browser".

A browser is a program capable of submitting a request
15 for information identified by an identifier, such as, for
example, a URL, receiving the requested information or page
identified by the URL, and rendering the requested page on a
display.

A problem arises when the length of a requested page is
20 such that the whole page cannot be completely displayed in a
single instance within the browser window on the display at
the client. "PageUp" and "PageDown" buttons are typically
provided that enable a user to move between discrete
portions of a page that are rendered separately on the
25 screen at different instances. However, it is difficult to
perceive the continuity between the discrete portions of
long Web pages that are separately displayed. The
formatting and pagination is not typically as precise in
electronic documents as it is in non-electronic books where
30 the pages are formatted and paginated extremely well. To

the contrary, it is not unusual for the last word of a first
displayed portion of a page to either appear in a middle of
a line on the next displayed portion, or be a part of a line
that was completely cut off from the displayed portion.

5   For example, Fig. 1A illustrates a first portion of a
Web page where the word "no" is the last word of that
portion. In the subsequent displayed portion, as shown in
Fig. 1B, the word "no" appears at the end of the second
line. As shown in Fig. 1B, it is difficult for a reader to
10 maintain continuity in reading from one displayed screen of
data to another when it is not obvious where the next word
is located on the subsequent displayed portion.

The problems related to long pages become more
prominent with more frequent use of PageUp and PageDown
15 buttons in connection with the rise in use of small display
screens that are associated with small Web clients including
personal digital assistants (PDA's), Web phones, and other
Web devices.

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SUMMARY OF THE INVENTION

The system, method and program of the invention improve
25 the readability of a Web page in a browser. When a browser
renders a portion of a page on the screen, the browser
parses the HTML page to determine the first and last word(s)
or line(s) or sentence(s) for the displayed discrete portion
of the long page. If a PageUp or PageDown button is
30 selected to display a previous or subsequent discrete

portion, then the appropriate previously determined word(s), line(s), sentence(s) are redisplayed in association with the following discrete portion being displayed. The previous word(s), line(s) or sentence(s) can be redisplayed in a

5 variety of forms and fashion for clearly delineating between the new information for that portion being currently displayed and any information repeated from a previous portion displayed. In this way, a reader can visually ascertain where to begin reading on a subsequent portion in

10 order to maintain continuity between the portions.

More specifically, in an embodiment of the invention, when a browser displays a current portion of a page, the browser identifies the first and last word on the currently displayed portion such as by highlighting, shading,

15 underlining, making bold, etc. If a PageUp or PageDown button is selected, then the corresponding next portion will show the same identification for that word. For example, if a PageUp button is selected, the first word from the previously displayed portion of the page will be identified

20 and will appear somewhere near the bottom of the next portion to be displayed. If a PageDown button is selected, the last word that was identified from the previously displayed portion will appear somewhere near the top of the next portion to be displayed. In further embodiments,

25 different identification types are used for the top and bottom of a current portion to aid the reader when the reader is paging up and down.

In another embodiment, text from one line, or a few lines, of a current portion are repeated on a next displayed

30 portion. However, a line or dotted line or dashed line or a

blank line or line space is used to delimit the material

previously viewed on a previous portion and the new material

on the next portion not previously seen on the previous

portion. In other embodiments, the previously viewed lines

5 on the next portion are identified by other means including

an arrow at the side of the line or by highlighting or by

other means.

10   BRIEF DESCRIPTION OF THE DRAWINGS

    For a more complete understanding of the present

invention and the advantages thereof, reference should be

made to the following Detailed Description taken in

15 connection with the accompanying drawings in which:

    Fig. 1A illustrates a first portion of a Web page;

    Fig. 1B illustrates a second portion of the Web page of

Fig. 1A resulting from a PageDown operation wherein the last

word from the first page is difficult to locate on the

20 second portion;

    Fig. 2 illustrates a network environment in which a

browser of a preferred embodiment of the invention resides

at a client within the network;

    Fig. 3 is a process flow diagram illustrating the logic

25 of a preferred embodiment of the invention;

    Fig. 4A illustrates a first portion of a Web page as

shown in Fig. 1A but wherein the last word of the first

portion is highlighted;

    Fig. 4B illustrates a second portion of the Web page as

30 shown in Fig. 1B but wherein the last word from the first

portion remains highlighted and is now easier to locate on
this second portion;

Fig. 5 illustrates a delineation between text that was
also on a previous displayed portion and new text on this
5 currently displayed portion of a page; and

Fig. 6 illustrates a block diagram of a browser
program.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, reference is made to the
accompanying drawings which form a part hereof, and which
15 illustrate several embodiments of the present invention. It
is understood that other embodiments may be utilized and
structural and operational changes may be made without
departing from the scope of the present invention.

With reference to the figures, and in particular with
20 reference now to Figure 2, a high-level block diagram of a
network computing environment in which a preferred
embodiment of the present invention may be implemented is
depicted. The computing environment 2 includes at least one
client computer 4 including a browser program or viewer
25 program 6, such as the Microsoft Explorer or Netscape
Navigator, that is capable of retrieving files from servers
11, 12, 13 over a network 10. The client computer 4 may
comprise any computer system known in the art capable of
executing a browser program. The servers 11, 12, 13 may
30 comprise any computer system known in the art capable of

maintaining files and making such files accessible to remote
computers. The browser 6 and servers 11, 12, 13 communicate
using a document transfer protocol such as the Hypertext
transfer Protocol (HTTP), or any other document transfer

5 protocol known in the art, such as FTP, Gopher, WAIS, etc.
The network 10 may be made up of a TCP/IP network, such as
the Internet and World Wide Web, or any network system known
in the art, e.g., LAN, Ethernet, WAN, System Area Network
(SAN), Token Ring, etc..

10   The client computer 4 may be, but is not limited to, a
personal computer, laptop, workstation, mainframe, or hand
held computer including palmtops, personal digital
assistant, smart phones, web enabled cellular phones, etc..
Client computer includes processor 40 and memory 50. Memory

15 50 includes volatile or nonvolatile storage and/or any
combination thereof. Volatile memory may be any suitable
volatile memory device, e.g., RAM, DRAM, SRAM, etc..
Nonvolatile memory may include storage space 12, e.g., via
the use of hard disk drives, tapes, etc., for data,

20 databases, and programs. The programs in memory include an
operating system 30 and application programs 20 including a
browser program 6. The browser program 6 displays a
graphical user interface in which content from a file
downloaded from one of the servers 11, 12, 13, such as a

25 HTML page, is displayed. The browser GUI displays graphical
buttons to perform operations related to the files
downloaded from a server as further described herein.

        The client computer 4 includes output devices (not
shown) including a display for displaying the browser GUI

30 and Web page and object content. The client computer also

includes at least one input device (not shown) through which
the user may enter input data to control the operation of
the browser program 6, such as a keyboard, mouse,
pen-stylus, touch sensitive screen, voice decoder for

5   decoding voice commands, etc.. In preferred embodiments, a
user at the client computer 4 can input commands to control
the browser program 6 through the graphical user interface
(GUI) generated by the browser 6 or input device controls,
such as keyboard keys, mouse buttons, touch pad regions,

10 that are programmed to cause the browser to perform specific
operations.

    Fig. 6 is an exemplary block diagram of a browser
program in accordance with a preferred embodiment of the
present invention. A browser is an application used to

15 navigate or view information or data in a network
environment, such as the Internet or the World Wide Web.

    In this example, browser 600 includes a user interface
602, which is a graphical user interface (GUI) that allows
the user to interface or communicate with browser 600. This

20 interface provides for selection of various functions
through menus 604 and allows for navigation through
navigation 606. For example, menu 604 may allow a user to
perform various functions, such as saving a file, opening a
new window, displaying a history, and entering a URL.

25 Navigation 606 allows for a user to navigate various pages
and to select Web sites for viewing. For example,
navigation 606 may allow a user to see a previous page or a
subsequent page relative to the present page. Preferences
such as those illustrated in Figure 6 may be set through

30 preferences 608.

Communications 610 is the mechanism with which browser 600 receives documents and other resources from a network such as the Internet. Further, communications 610 is used to send or upload documents and resources onto a network.

5 In the depicted example, communications 610 uses HTTP. Other protocols may be used depending on the implementation. Documents that are received by browser 600 are processed by language interpretation 612, which includes an HTML unit 614 and a JavaScript unit 616. Language interpretation 612 will

10 process a document for presentation on graphical display 618. In particular, HTML statements are processed by HTML unit 614 for presentation while JavaScript statements are processed by JavaScript unit 616.

Graphical display 618 includes layout unit 620,

15 rendering unit 622, and window management 624. These units are involved in presenting Web pages to a user based on results from language interpretation 612.

Browser 600 is presented as an example of a browser program in which the present invention may be embodied.

20 Browser 600 is not meant to imply architectural limitations to the present invention. Presently available browsers may include additional functions not shown or may omit functions shown in browser 600. A browser may be any application that is used to search for and display content in a network

25 environment. Browser 600 may be implemented using known browser applications, such as Netscape Navigator or Microsoft Internet Explorer. Netscape Navigator is available from Netscape Communications Corporation while Microsoft Internet Explorer is available from Microsoft

30 Corporation.

The exemplary embodiments shown in Figs. 2 and 6 are
provided solely for the purposes of explaining the preferred
embodiments of the invention; and those skilled in the art
5 will recognize that numerous variations are possible, both
in form and function.

Fig. 3 is a process flow diagram illustrating the logic
of a preferred embodiment of the invention. The process
begins at 301 when the browser program is executed. A
10 processing loop continues 323 until a request for a
document, e.g., a Web page, is made, 303. IF a request for
a Web page is made, the browser running at the client, or a
proxy server communicatively connected to the browser,
determines if it is a "long" Web page. That is, a
15 determination is made as to whether or not the complete
content of the requested Web page can be displayed within
the browser window as limited by the screen real estate of
the display for the client on which the browser is running.
If the complete page is too long to be completely displayed
20 at one instance within the boundaries of the browser GUI,
then it is considered to be a long Web page. If it is
determined that the Web page is not a long Web page 305,
then the requested page is rendered 321 and processing
continues 323. If it is determined that the requested page
25 is a long page 305, then the page is parsed to identify the
first and last word of each portion of the page to be
displayed 307. The first portion is rendered with the first
and last words visually identified 309, such as by highlight
or by other means. A determination is made as to whether or
30 not a PageUp or PageDown button is selected 311. If neither

of the PageUp and PageDown buttons have been selected, then processing continues 331 until the PageUp or PageDown button is selected 311 or until there is a request for a new document 333. If either the PageUp or PageDown button is

5 selected 311, then the following occurs as shown at block 313. The next appropriate portion (depending upon whether PageUp or PageDown was selected) is rendered with the new identifications visually indicated. When rendered, this next portion also incorporates visual indications of the

10 identifications made for the previously rendered portion. When displaying this next portion, the browser also visually delineates any new information that is currently displayed from any information being currently displayed that was also previously displayed with the previous portion.

15   Fig. 4A illustrates a first portion 401 of a Web page 400. Web page 400 is the same Web page as shown in Fig. 1A. However, utilizing a preferred embodiment of the invention, Fig. 4A shows the last word "no" 411 as being highlighted. Other embodiments may identify the last word by other means

20 such as by shading, underlining, making bold, etc.

      Fig. 4B illustrates a second portion 402 of the Web page 400 as shown in Fig. 1B but wherein the last word 411 from the first portion 401 of Fig. 4A remains highlighted and is now easier to locate on this second portion 402.

25 This enables the reader to continue reading the document without a break in continuity, i.e., without trying to locate where the reader left off from the previous portions of the page. It should be noted that the first new word "new" 412 of this second portion 402 is highlighted, also.

30 In some embodiments, the two words 411, 412 are identified

using two different identification means (for example, having each word in a different color, or having one bold and the other italicized, etc.) The two different identification means aid the user in knowing where the

5 previous portion ended and where the new portion picks up. This is helpful not only in providing the reader continuity in reading from one portion to the other, but in providing an indication to the user of this first word if the user selects a PageUp button wherein this first word 412 may be

10 then the last word displayed in a subsequently displayed portion of a page. In a preferred embodiment, if there were yet at least another portion to be displayed after this second portion, then the last word "Technology" 422 of this portion 402 would also be highlighted. As such, if the

15 PageDown button were to be selected, then the word "Technology" would be displayed on a subsequent third portion in a similar manner as the word "no" 411 was displayed on this second portion 402.

It should be noted that although the invention is

20 described above showing only individual last and first words identified in the various portions of the page, other identifications may also be made, including but not limited to identifying a group of words, or sentences or lines at the beginning and end of the various page portions. In

25 other embodiments, the previously viewed lines that were a part of a previously displayed portion of the page may be identified in a currently displayed portion by an arrow or other marking off to one or both sides of the line.

Fig. 5 illustrates a delineation between text 501 that

30 was also on a previously displayed portion of a page and new

text 502 on a currently displayed portion of the page. The delineation may be made by inserting a line 511 or by other means such as a dotted, solid, or dashed line, or blank lines or spaces.

5   As herein described, the system, method and program of the invention further enable a browser to render long Web pages on a display screen of a computer in a way that enhances the reading of the pages. A long page is a page that is too long to be completely rendered at one given

10 instance on the display screen. The browser, or a proxy server in communication with the browser, determines if the whole page can be rendered in one instance within the browser GUI on the display screen. If not, the page is rendered in at least two portions. Content, such as one or

15 more words, lines, or a sentence, is visually identified, such as by highlighting, at the beginning of each portion which antecedes another portion, and at the ending of each portion which precedes another portion. The visually identified content is redisplayed in conjunction with a

20 rendering of an adjacent portion of the page in response to a selection of a page up or page down button by a user. As such each portion rendered contains some visually identified content from a previously rendered adjacent portion.

25   The preferred embodiments may be implemented as a method, system, or article of manufacture using standard programming and/or engineering techniques to produce software, firmware, hardware, or any combination thereof. The term "article of manufacture" (or alternatively,

30 "computer program product") as used herein is intended to

encompass data, instructions, program code, and/or one or more computer programs, and/or data files accessible from one or more computer usable devices, carriers, or media. Examples of computer usable mediums include, but are not

5 limited to: nonvolatile, hard-coded type mediums such as CD-ROMs, DVDs, read only memories (ROMs) or erasable, electrically programmable read only memories (EEPROMs), recordable type mediums such as floppy disks, hard disk drives and CD-RW and DVD-RW disks, and transmission type

10 mediums such as digital and analog communication links, or any signal bearing media. As such, the functionality of the above described embodiments of the invention can be implemented in hardware in a computer system and/or in software executable in a processor, namely, as a set of

15 instructions (program code) in a code module resident in the random access memory of the computer. Until required by the computer, the set of instructions may be stored in another computer memory, for example, in a hard disk drive, or in a removable memory such as an optical disk (for use in a CD

20 ROM) or a floppy disk (for eventual use in a floppy disk drive), or downloaded via the Internet or other computer network, as discussed above. The present invention applies equally regardless of the particular type of signal-bearing media utilized.

25   The foregoing description of the preferred embodiments of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modification and variations are possible in

30 light of the above teaching. For example, although

preferred embodiments of the invention have been described in terms of the Internet, other network environments including but not limited to wide area networks, intranets, and dial up connectivity systems using any network protocol

5 that provides basic data transfer mechanisms may be used.

It is intended that the scope of the invention be limited not by this detailed description, but rather by the claims appended hereto. The above specification, examples

10 and data provide a complete description of the manufacture and use of the system, method, and article of manufacture, i.e., computer program product, of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the

15 invention resides in the claims hereinafter appended.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent is set forth in the following claims.